

Testimony of

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College of Natural Sciences,  
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before the

*Subcommittee on Education and Early Childhood Development*

*Committee on Health, Education, Labor, and Pensions*

*United States Senate*

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**“Protecting America’s Competitive Edge Act (S. 2198):  
Finding, Training, and Keeping Talented Math & Science Teachers”**

## **UTEACH: A NATIONAL MODEL FOR TEACHER PREPARATION IN MATH AND SCIENCE**

The UTeach program was developed at The University of Texas at Austin to help address the disturbing shortage of qualified math and science teachers that exists in Texas and beyond. UTeach graduates are mathematics and science majors (not Education majors). They are strong students and they are becoming teachers in large numbers.

Prior to the development of UTeach the College of Natural Sciences at UT Austin was producing *very* few graduates certified to teach high school math or science. **In establishing UTeach we hoped to create a program that would attract a large number of strong students to this career path as a first-choice and that would train them to be outstanding, successful teachers.**

### ***Selected Awards for UTeach Graduates***

#### **2006**

- Elizabeth Abernathy (certified, Spring 2003) is selected as the Teacher of the Year at Kealing Middle School
- Katie Arrington (graduated May 2001, currently in the UTeach Master's Program) is selected as Math Curriculum and Instructional Specialist in Round Rock ISD
- Geoff Mathews (graduated Fall 2000) is selected as Technology Specialist in Round Rock ISD.

#### **2005**

- Michael Degraff (Graduated May 2005, currently in the UTeach Master's Program), teaching at Bowie High School in Austin ISD, is selected as Mathematics Chair Honored Graduate by the UT Mathematics Department
- Dan Powderly (Graduated Spring 2003) is named Teacher of the Year at Castleberry High School in Forth Worth.

#### **2004**

- David Villalobos (graduated Spring 2001) is selected as Travis HS Teacher of the Year.

#### **2003**

- Chris Vande Sande Mihealsick (Graduated Spring 2002) is selected as Teacher of Promise for Crockett High School in Austin

Our original aims have been met. From a pilot project with 28 students in the fall of 1997 UTeach has now matured to a high-profile, well-respected program with an enrollment of over 400 students/year. Nearly 300 students have graduated and nearly 89% are teaching, planning to teach, or actively searching for teaching positions. Over 75% of the graduates who began teaching in the Fall of 2001 or before are still teaching.

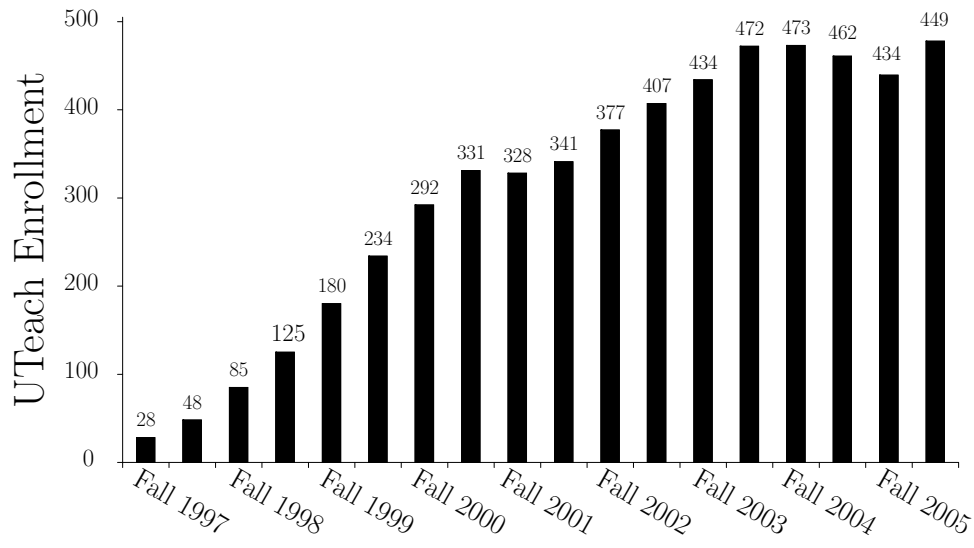


Figure 1: Growth of UTeach from 1997 to present.

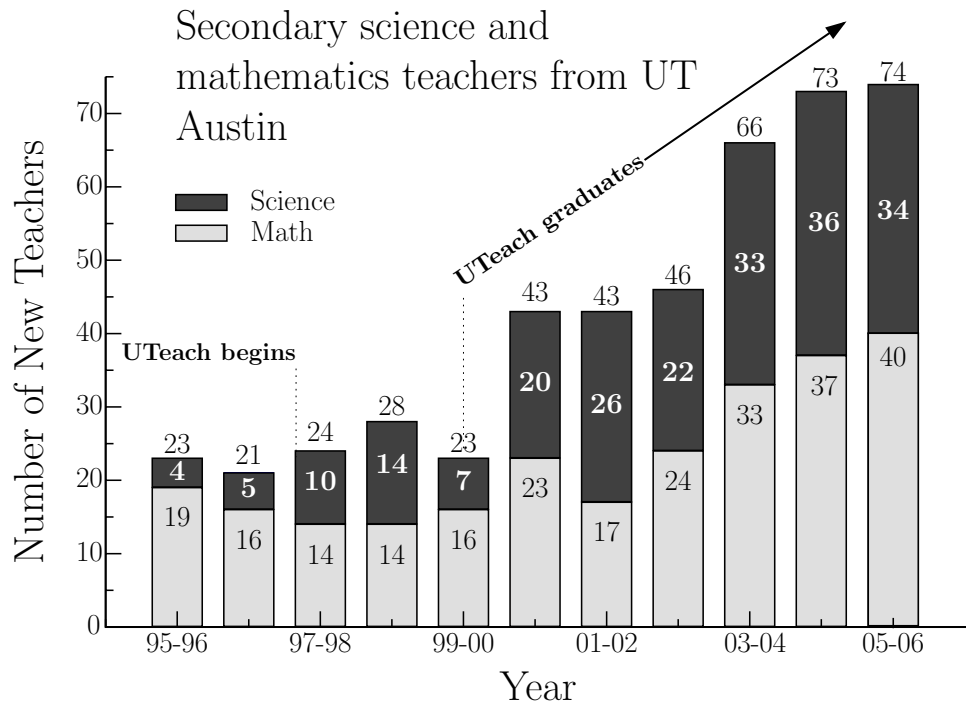
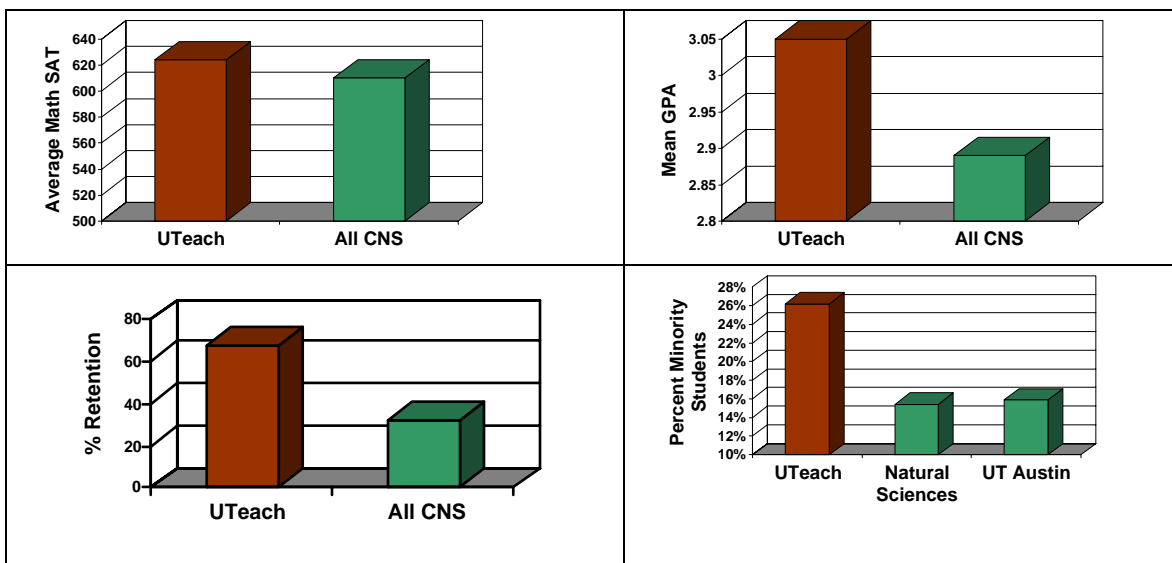


Figure 2: Numbers of majors certified to teach math and science at UT Austin from 1995 to present



**Figure 3: The quality of UTeach students is very high. As a group they have higher SAT scores, and higher grades in comparison to their College of Natural Sciences (CNS) undergraduate peer group. Approximately one-third of UTeach students are traditionally underrepresented minorities—twice as many as in the overall UT undergraduate population. Retention in the UTeach program is approximately twice as high as in the College of Natural Sciences as a whole. See <http://uteach.utexas.edu> for more information.**

Beyond its ability to attract top students into math and science education, the success of UTeach can be measured by its increasing stature as a model program for teacher preparation in which colleges of science and colleges of education work together with public schools. On the UT Austin campus, the College of Liberal Arts has implemented its own version of UTeach. The UT System has declared UTeach to be a part of the *Every Child Every Advantage* initiative<sup>1</sup>, and the National Research Council<sup>2</sup> and the US Department of Education<sup>3</sup> have cited it as a model program. Texas A&M has implemented a program similar to UTeach after several discussions with us. Many other institutions in Louisiana, Colorado, and elsewhere are exploring ways to create similar programs. Indeed, to bolster its long-term economic prospects, which are largely dependent on the availability of a work force with science and math skills, California has embarked upon an initiative to improve teacher preparation and increase the number of certified math and science teachers graduating from its public universities<sup>4</sup>. The reform is based upon the UTeach model developed at UT Austin and is statewide in scope, with the full backing of the governor. This is an effort to quadruple California's annual production of credentialed science and mathematics teachers, from 250 per year to 1,000 per year by 2010. This initiative is the largest of its kind in the nation and although it has just begun, it is an example of the level of commitment that will be necessary to solve the teacher shortage problem.

<sup>1</sup> [www.utsystem.edu/EveryChild/K16PrgDes-Initiative1.html](http://www.utsystem.edu/EveryChild/K16PrgDes-Initiative1.html)

<sup>2</sup> *Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium*, National Academy of Sciences Press, (2000); *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, National Academy of Sciences Press (2005)

<sup>3</sup> [www.ed.gov/news/speeches/2004/03/03182004.html](http://www.ed.gov/news/speeches/2004/03/03182004.html);

[www.uteach.utexas.edu/about/recognition/Title11Report03.pdf](http://www.uteach.utexas.edu/about/recognition/Title11Report03.pdf)

<sup>4</sup> <http://www.universityofcalifornia.edu/academics/1000teachers/>

The following characteristics of UTeach have proven to be extremely important in attracting, retaining and successfully preparing large numbers of outstanding math and science majors for the teaching profession:

- **Experienced, outstanding former public school math and science teachers (Master Teachers<sup>5</sup>) have been hired by the College of Natural Sciences as non-tenure-track faculty (at this time we have 8 on staff), paid from the instructional budget to supervise field experiences and teach certain associated classes. They are tremendous role models for apprentice teachers; being knowledgeable about what new teachers really face and need, they supply real life experience, guidance, and inspiration. They have been essential in providing connections with Austin school district teachers and administrators. They model excellent teaching practice for the UTeach students and the UT Austin tenure-track faculty.**
- **Early positive teaching experience gets students interested in the program. In their first program semester, UTeach students have carefully supervised field experiences in public school classrooms using research-based instructional materials that give them successful but realistic teaching experiences, and let them judge whether teaching is a good personal choice. The first two UTeach courses are field experiences in Austin elementary and middle school classrooms guided by inspiring, veteran teachers. This experience typically creates satisfaction and a commitment to teaching in participating students. The introductory courses are offered at no cost to the students. Although this is not a great savings, it seems to be important in convincing students to participate.**
- **Innovative new professional development courses have entirely replaced the old education curriculum. The new courses focus on new theories of learning and on how to teach science or math effectively to diverse learners. They combine content material and pedagogy, are integrated with science and math courses, and emphasize the connections between the sciences and between mathematics and the sciences. Students acquire expertise with instructional technology through experiences woven throughout the pedagogy courses and learn how to use technology effectively in teaching. UTeach instruction models teaching practices expected of its graduates, emphasizing the use of inquiry and technology to engage students more deeply in learning mathematics and science. There are no generic education classes.**
- **UTeach was designed in consultation with a group of outstanding high school teachers and the State Board for Educator Certification, according to new state**

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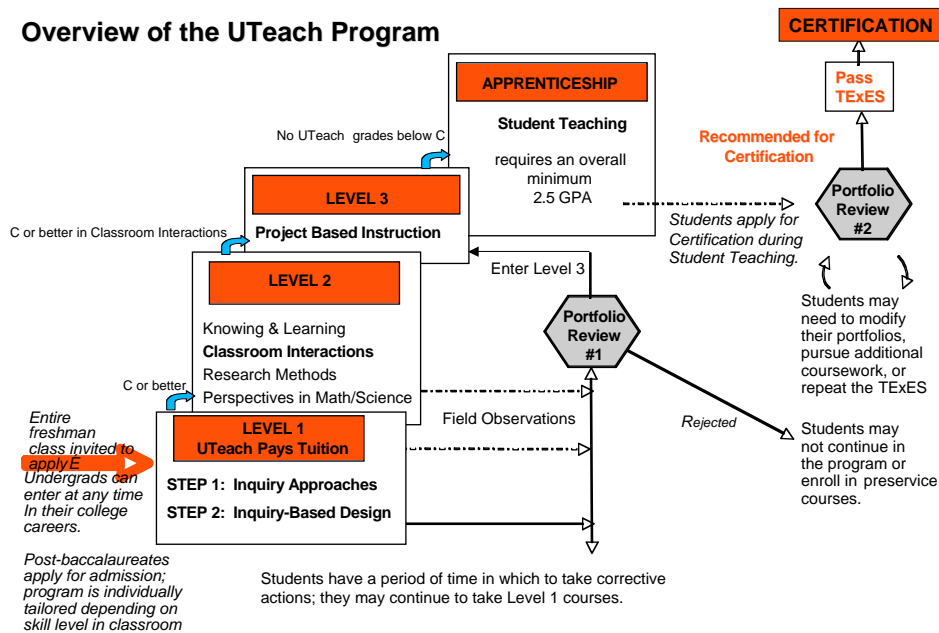
<sup>5</sup> A Master Teacher is an individual with at least 3 years public school teaching experience whom has put into practice the instructional strategies on which we will be evaluating UTeach students. Master Teachers are tremendous examples and guides, they are knowledgeable about what new teachers really face and need, and they are indispensable in providing connections with local school district teachers and administrators.

guidelines for teacher certification, and new national and state standards for K-12 education in math and science.

- All students in the College of Natural Sciences are recruited to join UTeach. We invite the whole freshman class to participate; letters of invitations go to new students before summer orientation followed by a presentation during orientation and additional invitations via mailings each year. Students also hear about the program through presentations to students groups, posters, and newspaper and television reports.
- Field experiences in AISD high school or middle school classrooms continue as part of the pedagogy courses under strong mentor classroom teachers, and with guidance from the UTeach master teachers. This further increases the positive reinforcement that good teaching experience provides and gives valuable practice in teaching. Since nothing enhances learning of a subject more effectively than teaching it, the field-oriented pedagogy courses reinforce mastery of the discipline. Every student receives detailed written commentary on his or her teaching from cooperating teachers, and whenever possible from course instructors and Master Teachers. Lessons may be video taped to provide opportunities for further analysis and reflection. All cooperating public school teachers who mentor UTeach students are paid for their efforts. All lessons taught by UTeach students in the field are based upon carefully prepared lesson plans that are available for review by course instructors, Master Teachers, and cooperating teachers prior to delivery.
- Student teaching is the final field experience and it is overseen by master teachers through the college of Natural Sciences. Mentoring and help, either on line or in person, continues even after students graduate and begin teaching. All UTeach students complete a portfolio that documents their accomplishments according to the state standards and additional UTeach program requirements. Final evaluation of teaching proficiency is done by trained observers, based on the candidate's classroom performance.
- UTeach is a 4-year program. Students can finish in 4 years with certification, having completed a strong degree program in mathematics or science with student teaching. Therefore students can obtain teaching certification without expending money or time beyond a normal undergraduate degree.
- UTeach degree plans are available for all teaching certifications grades 4-12 involving science, mathematics, and computer science. They are constructed with attention to state and national standards for teacher preparation in each discipline, including both process skills and content items. All the competencies of teachers required by the state, and assessed by the portfolio and final observation are covered during the UTeach course sequence. We also allow professionals to change careers and become teachers in an accelerated program that strikes the right balance between getting them into the classroom quickly and preparing them well enough so that they stay.
- All UTeach students have a research experience to expose them to the challenges

of open inquiry and technical accomplishment that characterize investigations in science and mathematics and to teach them how to facilitate such experiences for their own students.

### Overview of the UTeach Program



Courses listed with boldface type have field components

- Internships and scholarships are available for students who need them. Internships are funded from private donations solicited by the college; they provide financial help in an educational setting, augment student training and field experiences, and maintain commitment. 60-90 students per semester work in nonprofit educational settings. Tasks range from mentoring children in math and science outreach activities or assisting in Austin public school classrooms, to working in museums or preparing educational software.
- UTeach is a partnership between Colleges of Education and Natural Sciences (although the students are all Natural Sciences majors). This may not be essential but has been an important element of success at UT Austin
- The fact that this program developed at a Research 1 University means that very strong math and science students are involved in the program and we are able to infuse the program with an understanding of research and analysis as the foundations of science. The program could be replicated at non-R-1 universities and colleges, but a less well-prepared student body or faculty might mandate some enrichment activities in the discipline courses in order to have the level of discipline preparation that is characteristic of UTeach students.

Another critical concern is support for our UTeach graduates and other novice science and math teachers. Many new teachers leave the profession within their first two years of service. We believe that a substantial support system, including assistance with lesson plans, curriculum and advice on classroom management can make the difference between

first years that are rewarding or intolerable. To address this difficult problem we have developed, with support from the Michael and Susan Dell Foundation, a scalable, sustainable support system for novice math and science teachers. It involves on-site visits by experienced mentor teachers combined with 24-7 on-line help and on-demand Saturday workshops. We are also developing summer coursework leading to a Master of Arts in Science and Mathematics Education. We have established a graduate-level program of professional development that will lead to a UTeach Master of Arts in Science and Mathematics Education. This provides the context of an advanced degree path for our new-teacher mentoring program and will hopefully be an added incentive for our novice teachers to continue teaching. It will also provide a rigorous, practical, high-profile path to a master's degree for in-service teachers across Texas. We believe the mentoring-to-masters continuum will enable participating teachers to develop from novices to seasoned professionals, and will provide more established teachers with practical opportunities for real professional renewal. For Texas this will mean more and stronger teacher-leaders in mathematics and science throughout the state.

Funding for the program comes primarily through university resources. About \$1.5M/year pays the normal costs of University instruction. However, some aspects of the program such as the internships, tuition for the first two courses, and the induction support for new teachers require private funds, and many private foundations and individuals have provided support since 1997. We are working to establish an endowment to permanently support these kinds of expenses and have raised over \$7 million towards a goal of \$15M. The income from this endowment as well as additional one-time funds from foundations and individuals augments The University of Texas support for the program.

### ***Replication of UTeach:***

The time has come to implement the UTeach model across the US. At UT Austin, where UTeach was pioneered, the number of secondary science and math teachers certified per year has increased dramatically since inception of the program. Now is the time for science, math and education faculty and administrators at other research universities to develop the same level of involvement in teacher preparation that has made UTeach a success.

The improvement of teacher preparation calls for programs that are effective, and based upon experience. Effectiveness needs to be valued more highly than novelty in this situation, and cooperation between institutions valued more highly than competition. Thus we recommend an alternative to the traditional merit review process.

A program aiming to affect most of the country's large public research universities could proceed in phases. A first phase might be to identify universities that already have the capacity to prepare many secondary mathematics and science teachers, and whose programs are largely consistent with the provisions outlined above. These universities would complete the process of developing model programs, and develop the capacity to assist other universities to do the same. UT Austin would welcome the opportunity to



share the strategies used to develop UTeach during this phase, and would be glad to improve UTeach through interactions with other universities. In a second phase, each of the model programs in phase I would assist universities in geographic proximity to develop their own new programs. A third phase should be sufficient to affect public universities willing to participate, and private universities willing to offer competitive opportunities. Universities not interested in participation might be persuaded by the successes in the first two phases. Principal Investigators should be Deans of Arts and Sciences and co-PI's should be Deans of Education. Deans retain enough contact with faculty and departmental issues to ensure program implementation but are high enough in the administrative hierarchy of most universities to effect permanent change.

We suggest that replication awards be for 6-8 years, focused on creation of teacher preparation programs on the UTeach model. Suggested requirements for a successful application appear in Appendix 1. Successful applicants would be reviewed annually. Continued funding for the full term would be tied to progress on specific benchmarks.

Funds should be granted on an annual basis, subject to review and successful completion of benchmarks for enrolling and graduating students, creating courses and degree plans, and employing staff. Note that an important component of the program is the adoption of teacher preparation as a *well-supported, permanent part of normal university operations*. Therefore the grants should be set at a size designed to *enable a new program to begin, without creating dependency that threatens the program when federal funding terminates*. Appropriate uses of grant funds include hiring Master Teachers, employing support staff, summer salary for participating faculty, or funds for student recruitment such as tuition remission. In any successful program, costs will rapidly exceed the amount of the grant. *Deans, Provosts, and Presidents must therefore be aware of the commitment they are making as the process begins*. Specific, explicit commitments on the part of the central administration *should be required* as a condition of participation in the form of an MOU. Potential for additional state support for a program should be part of this planning process.

In endeavoring to establish UTeach-like programs at other institutions, we must take into account differences in administrative structure, mission, location, and student population. For example, one hallmark of UTeach is the excellence of the math/science knowledge that UT Austin graduates possess, as evidenced by their high scores on certification exams and their classroom performance. If students do not enjoy the same degree of preparation in their discipline as UT Austin College of Natural Sciences majors, it may be necessary to enrich the science and mathematics curriculum at their universities. This would require additional funding. We have developed a program at UT Austin focused on at risk students admitted under Texas House Bill 588 passed in the 75<sup>th</sup> legislature that granted automatic admittance to all high school graduates in the top 10% of their graduating class to any Texas public college or university. This program, called the Texas Interdisciplinary Plan, is described in Appendix 2. It emphasizes enrichment activities, mentoring, small class sizes and work on applied problems. It has been very successful at UT Austin, fits well with the UTeach curriculum, and could be adapted to augment basic math and science programs at other universities. Similarly, UT Austin is

located in a large metropolitan area that affords many and varied classroom experiences for our students. This has been extremely important to the success of the UTeach program. Universities located in more rural settings will face special challenges with respect to providing field experiences for pre-service students, and we would need to find ways to address this issue to achieve maximum success in these regions.

In summary, we seek to help create an initiative that will assist other universities to develop programs similar to UTeach that redefine how math and science teachers are trained. We suggest the creation of a federal initiative with a goal of enabling institutions across the country to increase the number and **quality** of science and mathematics majors obtaining teacher certification with funding dependent upon incorporation of the elements of success that we have demonstrated in the UTeach program. Providing scholarships to students attending traditional programs is insufficient to produce the type of teachers needed to lead more students to careers in math and science. It is critical that any federal initiative serious about transforming math/science education in the United States include funding for institutions to develop teacher-training programs as innovative and effective as UTeach.

#### ***Profiles of UTeach Students and Graduates***

***UTeach students come from many backgrounds and bring many different strengths to support their hopes of changing lives through teaching. These students and graduates will be glad to discuss their experiences at UT Austin, in UTeach, and as future and current teachers.***

##### ***Current UTeach Students:***

***April Lisa Olivarez:*** April Lisa is a senior majoring in mathematics, who is student teaching this semester. She comes from south Texas and she and her brother were the first in her immediate family to attend college. While still in high school, she took courses at UT Pan American and South Texas College, along with math and computer science AP courses. She ranked 8th out of 614 students at Mission High School and came to UT Austin in the fall of 2002. She is an officer in the UTeach student organization and also works with a youth group five times each week as a mentor.

***Janice Trinidad:*** Janice graduated summa cum laude from Fordham University with a Bachelor of Science in physics. She was admitted to the UTeach program for post-baccalaureates in the spring semester of 2005. She is working as a teaching assistant while conducting research and taking coursework towards teacher certification in physics and math, the UTeach Master of Arts, and a Ph.D. in theoretical physics. She is a past and current recipient of the Noyce Scholarship, funded by the National Science Foundation.

***Jenna Saldaña:*** A sophomore mathematics major, Jenna comes from Carrizo Springs, Texas, a predominately Hispanic town close to the US/Mexican border. Jenna's dedication to quality education in our schools was demonstrated early in the program when she worked as a tutor/mentor in Dove Springs, an economically distressed neighborhood. Spanish is the first language for most of the students in that area. Jenna believes that her own fluency in Spanish is an asset in her work with these children. She is working towards certification in mathematics.

***Tyler Ham:*** Tyler is a senior majoring in mathematics. For the past 3 years, he has also been a UTeach employee, working as the program's webmaster and data analyst. He graduated from Sam Houston High School in Arlington, Texas, second in his high school class of 373 students. His strong high school performance, taking AP classes in math and physics, English, chemistry, computer science, and history, has carried over into college course work. He is pursuing certification in mathematics.

**Alba Esparza:** Alba is a junior majoring in mathematics at The University of Texas at Austin. Originally from El Paso, she graduated from Clint High School near the top of her class, taking AP courses in mathematics. Now in her second semester with UTeach, she is working towards the goal of becoming a middle or high school math teacher.

**Meagan Vickers:** Meagan graduated second in a class of 99 students at Columbus High School in Columbus, Texas, a small town between Houston and San Antonio. Currently, Meagan is a senior and student teaching towards her certification in mathematics. Meagan has received University Honors every semester she has been with UT.

**UTeach graduates:**

**Ditrell Binkley:** Ditrell graduated from The University of Texas at Austin in 2004 with a degree in mathematics. Though graduating first in his high school class of 360 students, Ditrell hit a few rough patches on the road to graduation from UT. He left UTeach for a couple of semesters, but a conversation with one of our Master Teachers brought him back into the program. Ditrell began teaching for Paredes Middle School in 2004. Beginning in 2005, while still at Paredes, Ditrell began work on a UTeach Masters in Math Education. Ditrell is dedicated to educational reform and intends to become an administrator.

**Eliana Prada Owens:** Eliana came to the U.S. from Venezuela in 2000. After taking courses at Austin Community College, she was accepted to The University of Texas at Austin, where she majored in mathematics. A native Spanish-speaker, Eliana was a self-motivated student, determined to excel academically. She graduated with honors in the fall of 2003. Her first teaching job was with Georgetown High School, and now she is teaching mathematics at Stony Point High School in Round Rock. Eliana has been very successful in implementing the kinds of inquiry-based learning techniques emphasized by the UTeach Program. She has been a student in the UTeach Masters in Education program at UT since the summer of 2004.

**Steven Sinski:** After graduating from high school in San Antonio, Steven came to The University of Texas at Austin where he earned a bachelor's degree in Biology in the fall of 2005. He is working for the UTeach program and will be searching for a teaching position in the fall.

**Natalie Pickering Wieland:** Originally from New Mexico, Natalie graduated in December 2005 with a Bachelor of Science in chemistry and a perfect 4.0 GPA. She received the Noyce Scholarship, funded through the National Science Foundation, and is currently teaching at Round Rock High School.

**Jesse de la Huerta:** Despite the difficulties of living as an English language learner while in the public schools of south Texas, Jesse graduated from Rivera High School in Brownsville ranked 7th in a class of 296 students. Jesse earned his undergraduate degree in mathematics from The University of Texas at Austin in the fall of 2004. Currently, he teaches in Austin, Texas, at the International High School, one of the magnet schools at Johnston High School, where he says he has found his calling.

**Katie Weber:** Katie graduated from The University of Texas at Austin in 2004 with a Bachelor of Science in Biology. She received University Honors during each of her nine semesters as a Longhorn and was a speaker at Commencement. Currently, she's teaching at Henry Middle School in Leander, TX.

**David Vance Ballard:** Vance came to UTeach through an unconventional route that included a stint as a deputy sheriff. He graduated from The University of Texas at Austin in 2005 with a bachelor's degree in Biology. He is now teaching for Del Valle High School in the Austin, Texas area.

## **APPENDIX I: *Conditions for awards:***

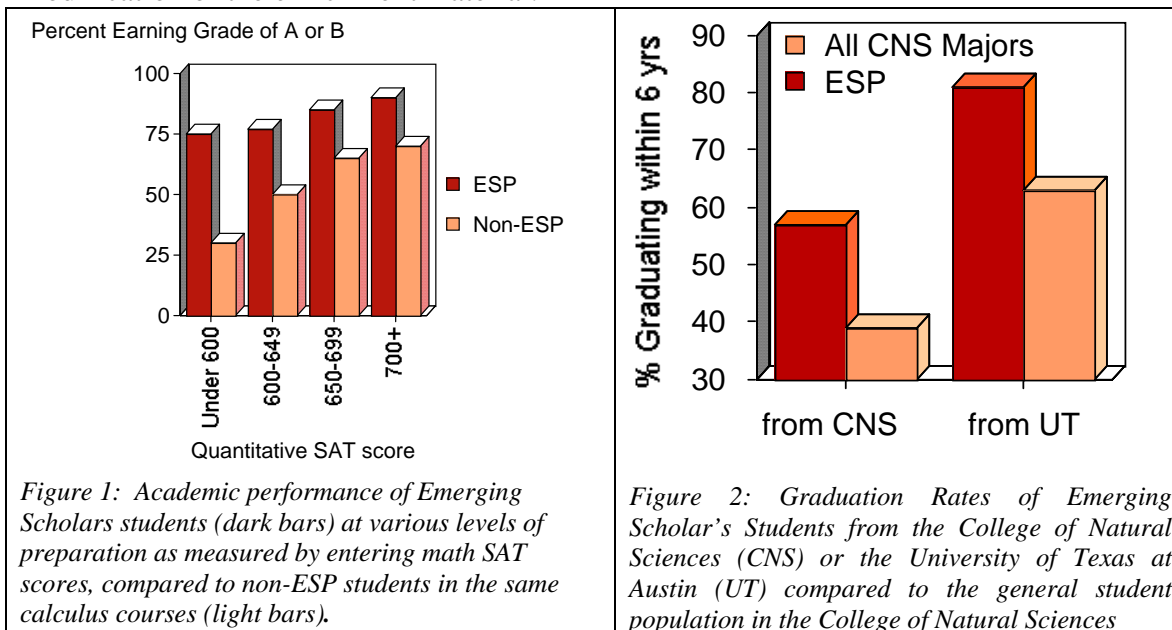
To be awarded support, a university would need to develop a plan for the improvement of teacher preparation in science and mathematics with the following elements.

- Description of current certification rate of science and mathematics teachers.
- Statement of goals for improvement with timeline describing numbers of students enrolled in program and graduating.
- Description of any existing university programs that indicate university capacity to develop teacher certification on the UTeach model.
- Identification of an organizational unit within the College of Arts and Sciences or College of Science that will adopt teacher certification as its primary mission with signed agreement from the central administration.
- Identification of core faculty in departments of science and mathematics who will champion teacher preparation in their departments by teaching courses dedicated to preparing future teachers, help create new degree plans, advise prospective students within their major, and assist as needed with program administration.\*
- Identification of core faculty in the College of Education who will champion teacher preparation in their departments by creating and teaching courses specific to the preparation of secondary science, mathematics, and computer science teachers and working closely with colleagues in Colleges of Arts and Sciences.\*
- Description of the process to be used in locating classrooms for field experiences. Supporting letters from school officials able to coordinate relations between university and school districts required.
- Description of courses to be created over the funding period, focusing on courses involving practical experience in teaching. These must involve early field experience.
- Description of degree plans existing or to be created enabling students to graduate in 4 years with a major in science, mathematics, or computer science and secondary teaching certification. Programs must make possible graduation in 4 years with certification. Post-baccalaureate programs may also be included.
- Description of schedule for hiring Master Teachers to supervise field experiences. Programs must involve former secondary teachers employed full time at the university.
- Description of other program elements, such as teaching portfolio, student support, opportunities for community service, student organization.
- Supporting letters from the Deans of Science and Education and the President or Provost of the university are required. These letters must describe the internal university resources that will be made available as the project proceeds. These include:
  - Identification of space to house the new unit
  - Identification of administrative support as program grows, including administrative assistants and advisors
  - Identification of faculty and instructional lines to be committed
  - Commitment to make fundraising from private sources for the improvement of teacher preparation in science and mathematics a high priority at the university.

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- Letters from each faculty member, describing their interest and commitment to teacher preparation are required.

## Appendix II: Enrichment activities for students with poor preparation for advanced mathematics or science at UT Austin: the Emerging Scholars Program and the Texas Interdisciplinary Plan

When math-challenged Calculus students are accepted into the Emerging Scholars Program they feel special and proud. Other students respect, even envy them. They do extra and harder problems than the other students rather than easier and fewer, but they do them in teams with expert guidance from specially trained teaching assistants. Emerging Scholars register for an extra course in addition to the regular Calculus class. The extra class (which meets for six hours a week) is run by two teaching assistants who devise hard but *practical* problems for them and help the students learn how to work them. We have a great deal of data on this program because we have run it for nearly fifteen years. When they emerge from this program, ESP students are fully competitive with the other students. They move from getting D's and F's on their Calculus tests to A's and B's (see figure 1 below). An added benefit is that the numbers of minority math majors has risen steadily, because many of our ESP students have gone on to major in math! Without the Emerging Scholars Program many would not even have passed Calculus. Graduation rates are substantially higher among ESP students relative to other College of Natural Sciences students (see figure 2 below) even though this is only one course in their program. The increase in self confidence achieved with ESP has a profound impact. A similar approach works in other subjects such as Chemistry, but with modification of the enrichment material.



The **Texas Interdisciplinary Plan (TIP)** is a broader enrichment program based upon the principles of success demonstrated by the Emerging Scholars Program. Like ESP, TIP has been developed to assist students who are likely to be at-risk in their transition to the University of Texas at Austin.<sup>6</sup> TIP uses many of the same techniques as ESP,

<sup>6</sup> TIP was created to serve a new population of students automatically admitted to The University under the top 10% rule. This statute, House Bill 588 passed in the 75<sup>th</sup> legislature, grants automatic admittance to all high school graduates

particularly the extra enrichment in small groups and cohort study teams. The average TIP class size is 50 or less instead of the College average of 100, and classes are taught by instructors especially selected for their outstanding teaching record. Each basic science course has one to two hours of supplemental instruction each week in addition to a TIP seminar (see below) with a format that is similar in structure to the Emerging Scholars model. Students are personally assisted by upper class peer mentors.

*Peer mentors* are trained in time management, group dynamics, campus resources and services, and how to successfully assist students in their coursework. They offer academic and social guidance and support to TIP students. Selected for excellent academic performance, major, and leadership experience, peer mentors are upper division students who have themselves shown great capacity to overcome obstacles and succeed in our rigorous undergraduate curriculum. They work as academic tutors and assistants to TIP instructors and provide an introduction to UT social life through activities such as a bowling tournament in the Student Union, a tour of library services and resources, and a picnic lunch on one of the malls. Peer mentors are asked to reflect on their experiences and to continue their own training at weekly meetings with their supervisor. They play a critical role in the success of each of their TIP students.

In addition to their regular classes, TIP students attend a three-hour seminar/workshop each week at which students are coached in strategies for achievement in their course work, good study habits, and answers to specific questions. The TIP program coordinator in the Dean's Office also organizes special events as a part of this seminar to introduce TIP students to scientists at UT and in the broader community. This immediate link of the student experience to potential future career development is important. Researchers, physicians, medical school administrators and graduate students are among the speakers. Like the additional problems sessions that Emerging Scholars students take, the TIP seminar course is at the heart of the program. It is the innovative academic venue where core course issues of immediate concern to PENS students can be aired and addressed.

In the fall of 2004 we added a TIP signature course for freshman: a *Critical Thinking Seminar* that challenges students to examine their own thinking from the perspective of rigorous intellectual standards. The seminars are kept small (approximately twenty students) to ensure a high level of student-to-student interaction. The curriculum includes two innovative student projects, including a Nobel Prize term-project and peer presentations on current issues and events.

The results of the 1999 pilot program were extremely good. TIP students had an average freshman GPA of 2.94, compared to 2.6 in the control group. They also had many fewer students on academic probation (6% compared to 23%). It is important to emphasize that these students took classes that were just as hard as the larger sections. In some cases

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in the top 10% of their graduating class to any Texas public college or university. TIP participants are drawn from this pool of students and further selected for their persistence in overcoming the challenges of low socioeconomic background. The invitation is specifically worded to emphasize the rigor and special opportunities of TIP, such that students regarded it as an honor to be invited to join. Nearly all TIP students were in the top 10% of their graduating class, close to half are among the first in their families to attend college, many are female, and more than 60% are of an underrepresented ethnic minority.

they took exactly the same exams, but they had extra attention and tutoring, extra work, and smaller classes. They scored better *despite having an SAT a full 200 points below the college average*. Success was achieved despite taking a *more rigorous curriculum* (three math and science course instead of the more common two) than the typical incoming CNS student. More recent results from academic year 2004-05 are summarized below.

<b>TIP freshmen are academically more successful during their first semester at UT.</b> This trend has been consistent over the past several years.		
<b>Fall Grade Point Average</b>	<b>TIP</b>	<b>Control</b>
Life Science	3.01	2.53
Computer Science	2.81	2.43
<b>TIP freshmen are four times less likely to be on academic probation,</b> independent of their gender, race or first generation status.		
<b>% on Probation Spring 2005</b>	<b>TIP</b>	<b>Control</b>
Life Science	5%	19%
Computer Science	0%	26%
<b>TIP students are almost twice as likely to graduate from the College of Natural Sciences as non-TIP students.</b> Twenty-nine of the original 1999 cohort (N=46) have graduated from UT Austin with an average GPA of 2.91. Of these students, 72% graduated in the College of Natural Sciences while only 42% of control students graduated in the College.		

The TIP model provides some important lessons with respect to developing a successful UTeach program at Universities and Colleges where the student population is less well-prepared than students at UT Austin. We expect that an enrichment program with focus on mentoring, application of coursework to workplace settings (this is a natural consequence of the field experience that is a part of many of the UTeach pedagogy courses), small class size and enrichment activities will be necessary and effective in producing teachers who are extremely well-prepared in their discipline.